Original Article

Evaluation of Central Corneal Thickness after Cataract Surgery in Eyes with Pseudoexfoliation Syndrome

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Article Notes:

Received: Aug. 4, 2018
Received in revised form: Oct. 14, 2018
Accepted: Nov. 12, 2018
Available Online: Jan. 5, 2019

Keywords:

Corneal thickness
Extraction
Cataract
Pseudoexfoliation syndrome

Abstract

Purpose: To compare central corneal thickness after phacoemulsification in patients with and without pseudoexfoliation syndrome.

Patients and Methods: A total of 130 eyes who were candidates for phacoemulsification (60 eyes with pseudoexfoliation syndrome and 70 eyes without pseudoexfoliation syndrome) in Shahid Sadoughi Hospital, Yazd, Iran were included in this prospective study. Before the surgery and one day postoperatively central corneal thickness was measured in all eyes using Lenstar LS 900 biometer (Haag-Streit(®)) and compared between the case and control groups.

Results: Central corneal thickness before surgery was not significantly different between two groups (509 ± 29.28 µm in study group and 516 ± 32.11 µm in the control group, P = 0.27). Postoperatively, the central corneal thickness in pseudoexfoliation group (589 ± 36.91 µm) was significantly higher than the control group (553 ± 32.77 µm) (P < 0.001).

Conclusion: The mean central corneal thickness was significantly higher in patients with pseudoexfoliation compared to patients without pseudoexfoliation after cataract surgery. We suggest that phacoemulsification in cataract surgery candidates with pseudoexfoliation should be performed more carefully and with special considerations.

How to cite this article: Gohari M, Karimi N, Manaviat MR. Evaluation of Central Corneal Thickness after Cataract Surgery in Eyes with Pseudoexfoliation Syndrome. Journal of Ophthalmic and Optometric Sciences . 2019;3(1): 16-9.

Introduction

Pseudoexfoliation (PEX) syndrome is an age-related disorder which is characterized by granular extracellular material deposition; mainly in the anterior segment of the eye and also other tissues [1-3]. The prevalence of PEX in population over 60 years is 10 to 20 percent and is estimated to be around 40 % in population over 80 years [4,5]. PEX can cause secondary open angle glaucoma, zonular weakness, poor pupillary dilation and corneal endothelial decompensation [6].

It seems that in patients with PEX, an endothelial disorder is present which makes the cornea susceptible to endothelial loss and edema after ophthalmic surgeries specially phacoemulsification [7,8]. Corneal edema can cause visual loss and if persistent, the patient may require corneal transplant.

Since corneal thickness can be considered as an indicator for endothelial damage [9], in the present study we aimed to compare the central corneal thickness (CCT) in patients with PEX and those without PEX who were candidates for phacoemulsification.

Patients and Methods

In this prospective comparative study, a total of 60 eyes with PEX and 70 eyes without PEX who were phacoemulsification candidates were compared. The study was approved by our institutional ethics committee and informed consent was obtained from all participants before entering the study. Eyes with any corneal or posterior segment pathology, extracapsular cataract extraction indication, previous history of ocular infection or surgery, and dilated pupil diameter of less than 4 mm were excluded from the study. All eyes underwent full ocular examination by an ophthalmologist one day preoperatively. Diagnosis of PEX was confirmed by an ophthalmologist based on the presence of gray whitish material on pupillary margin and lens capsule during slit lamp examination. CCT was measured using Lenstar LS 900 biometer (Haag-Streit(®)). All examinations were repeated one day after surgery.

All phacoemulsification procedures were performed by a single expert ophthalmologist using phaco-chop technique in Shahid Sadoughi Hospital, Yazd, Iran.

Statistical analysis was performed using SPSS version 22 (Armonk, NY: IBM Corp.). Numeral variables were reported as mean ± standard deviation (SD). We used t test to compare variables between the two groups.

Results

The mean age of the patients was 67.4 ± 8.36 and 66.61 ± 11.12 years in PEX and control groups, respectively. While in PEX group 47 % of patients were male and 53% were female; in the control group 59 % of patients were male and 41 % were female. There was no statistically significant difference in sex distribution and mean age between the case and control groups.

Table 1 shows the mean operation time and phaco-power in the case and control groups.

Table 1: Comparison of operation indices in the PEX and control group

Operation indices	PEX group	Control group	P value*
Phaco-power (%)	32.25 ± 2.5	32.70 ± 2.5	0.68
Time (minutes)	25.2 ± 0.6	24.2 ± 0.6	0.32

*T-test

Table 2: Comparison of preoperative and postoperative CCT in the PEX and control group

CCT (µm)	PEX group	Control group	P value*
Preoperative	509 ± 29.28	516 ± 32.11	0.27
Postoperative	589 ± 36.91	553 ± 32.77	< 0.001

*T-test

There was no statistically significant difference between the two groups regarding the mean operation time and phaco-power.

Table 2 shows CCT values measured using Lenstar LS 900 biometer (Haag-Streit(®)) in the case and control groups preoperatively and postoperatively. Preoperative CCT in PEX group was lower than the control group but the difference was not statistically significant (509 ± 29.28 µm versus 516 ± 32.11 µm respectively, P = 0.27) (Table 2). Postoperative CCT in PEX group was significantly higher than the control group (589 ± 36.91 versus 553 ± 32.77, P < 0.001). In both groups CCT increased after phacoemulsification (Table 2).

Discussion

Central corneal thickness and corneal volume can be considered as indirect indicators of corneal endothelial function. Endothelial damage, after phacoemulsification could result in corneal edema and corneal volume increase in PEX and non-PEX eyes [10,11].

In our study, there was not any significant difference in operation time and phaco-power between the two groups (PEX and non-PEX eyes).

We observed that preoperative CCT was somehow lower in PEX eyes than non-PEX eyes, but this difference was not statistically significant. Similar to our findings Ahmad et al., [12] in a prospective study, measured the central corneal thickness and corneal endothelial cell parameters in patients with pseudoexfoliative glaucoma and observed that the mean CCT value was significantly lower in PEX group than the control group. In contrast Puska et al., [13] observed that PEX eyes had significantly higher values for CCT compared to the fellow non-PEX eyes in 40 normotensive eyes.

In a non-randomized study, Hayashi et al., [10] compared corneal endothelial cell density (ECD) and CCT in PEX eyes and non PEX eyes 1 and 3 month after phacoemulsification. They found that the mean CCT was similar between the two groups throughout the follow-up period; however, the percentage of increase in CCT was significantly greater in the PEX group compared to the non-PEX group one month after cataract surgery (P = 0.0152) [10]. They concluded that the transient increase in CCT and corneal endothelial cell loss were greater after phacoemulsification in eyes with PEX compared to eyes without PEX [10]. Similarly in our study we found significantly higher CCT values after phacoemulsification when comparing PEX and non PEX eyes. This result indicates that patients with PEX might be more vulnerable to damage after cataract surgery.

Conclusion

The mean CCT was significantly higher in patients with pseudoexfoliation compared to patients without pseudoexfoliation one day after cataract surgery. We suggest that phacoemulsification in cataract surgery candidates with pseudoexfoliation should be performed more carefully and with special considerations.

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References

1. Naumann GO, Schlötzer-Schrehardt U, Küchle M. Pseudoexfoliation syndrome for the comprehensive ophthalmologist. Intraocular and systemic manifestations. Ophthalmology. 1998;105(6):951-68.
2. Schlötzer-Schrehardt U, Naumann GO. Ocular and systemic pseudoexfoliation syndrome. Am J Ophthalmol. 2006;141(5):921-37.
3. Ritch R. Exfoliation syndrome. Curr Opin Ophthalmol. 2001;12(2):124-30.
4. Jonasson F, Damji KF, Arnarsson A, Sverrisson T, Wang L, Sasaki H, et al. Prevalence of open-angle glaucoma in Iceland: Reykjavik Eye Study. Eye (Lond). 2003;17(6):747-53.
5. Ringvold A. Epidemiology of the pseudo-exfoliation syndrome. Acta Ophthalmol Scand. 1999;77(4):371-5.
6. Ritch R, Schlötzer-Schrehardt U, Konstas AG. Why is glaucoma associated with exfoliation syndrome? Prog Retin Eye Res. 2003;22(3):253-75.
7. Schlötzer-Schrehardt UM, Dörfler S, Naumann GO. Corneal endothelial involvement in pseudoexfoliation syndrome. Arch Ophthalmol. 1993;111(5):666-74.
8. Naumann GO, Schlötzer-Schrehardt U. Keratopathy in pseudoexfoliation syndrome as a cause of corneal endothelial decompensation: a clinicopathologic study. Ophthalmology. 2000;107(6):1111-24.
9. Perone JM, Boiche M, Lhuillier L, Ameloot F, Premy S, Jeancolas AL, et al. Correlation Between Postoperative Central Corneal Thickness and Endothelial Damage After Cataract Surgery by Phacoemulsification. Cornea. 2018;37(5):587-90.
10. Hayashi K, Manabe S, Yoshimura K, Kondo H. Corneal endothelial damage after cataract surgery in eyes with pseudoexfoliation syndrome. J Cataract Refract Surg. 2013;39(6):881-7.
11. Wong MM, Shukla AN, Munir WM. Correlation of corneal thickness and volume with intraoperative phacoemulsification parameters using Scheimpflug imaging and optical coherence tomography. J Cataract Refract Surg. 2014;40(12):2067-75.
12. Ahmad G, Banday SSB, Wani JS, Banday SSB. Evaluation of Central Corneal Thickness and Corneal Endothelial Cell Parameters in Pseudoexfoliative Glaucoma. J Clin Exp Ophthalmol. 2017;8(661).
13. Puska P, Vasara K, Harju M, Setälä K. Corneal thickness and corneal endothelium in normotensive subjects with unilateral exfoliation syndrome. Graefes Arch Clin Exp Ophthalmol. 2000;238(8):659-63.

Footnotes and Financial Disclosures

Conflict of interest:

the authors have no conflict of interest with the subject matter of the present study.